



Economic Impact Analysis Virginia Department of Planning and Budget

18 VAC 10-20 – Board of Architects, Professional Engineers, Land Surveyors, Certified Interior Designers and Landscape Architects Rules and Regulations Department of Professional and Occupational Regulation July 29, 2006

Summary of the Proposed Regulation

As permitted by Chapter 440 (2005 Acts of Assembly), the Board of Architects, Professional Engineers, Land Surveyors, Certified Interior Designers and Landscape Architects (board) proposes to create a sub-licensure of land surveyors that will encompass photogrammetrists as well as users of any other remote sensing technologies that are currently in use or have yet to be developed. Also pursuant to Chapter 440, individuals are exempted from having to be licensed if they use photogrammetry or other remote sensing methods only to:

- “(i) determine topography or contours, or to depict physical improvements, provided such maps or other documents shall not be used for design, modification, or construction of improvements to real property or for flood plain determination,” or
- “(ii) graphically show existing property lines and boundaries on maps or other documents provided such depicted property lines and boundaries shall only be used for general information.”.

Result of Analysis

The costs likely exceed the benefits for this proposed regulatory change.

Estimated Economic Impact

Photogrammetry, in simple terms, is the practice of using overlapping aerial photographs to map contours and topography or to show physical improvements on the land being mapped. This method has been used since right after World War II as a means to map land more quickly, and at lower cost, than could traditional land surveying techniques.

Photogrammetry is of limited use when mapping areas where foliage blocks the view of the ground and is accurate to set specifications. Thus photogrammetric mapping of forested areas usually would occur in the fall or winter, after trees have dropped their leaves, and contracts for photogrammetric work would include the accuracy specifications required for whatever uses the maps will be put.

Laser Detection and Ranging (LIDAR) mapping is a newer technology that is used for the same end. Instead of overlapping aerial photographs, LIDAR uses information gained from bouncing rays of light (up to 70,000 pulses of light per second) off the ground below. This allows mapping of areas that are forested at any time of the year since some light pulse will go between the leaves of trees and hit the ground below. LIDAR is apparently less useful for mapping shorelines since the pulses of light are absorbed by water and do not very effectively bounce back to the equipment doing the mapping.

Any land under consideration can also now be mapped, again only with specified accuracy, using satellite imagery. Other remote sensing technologies may yet be developed.

Currently, photogrammetrists and users of other remote sensing technologies are not, and historically have not been, required to be licensed. The board proposes to set up a license designation for land surveyor photogrammetrists that will be a discrete sub-licensure of land surveying. The board reports that this sub-licensure will only require competency in a specific sub-set of land surveying skills. This notwithstanding, the board proposes to require photogrammetrists and users of other remote sensing technologies to meet education and experience requirements that are identical in length to those required of land surveyors.

This sub-licensure program does have provisions to allow currently practicing photogrammetrists who meet certain criteria to continue practicing throughout the period that it takes for them to meet all the requirements for licensure.

Currently practicing photogrammetrists who do not meet these criteria, as well as individuals wanting to enter this field, will have to discontinue, or forego, independent practice until they are able to complete a two stage licensure process. They will have to complete a four year degree in an approved field (currently only a degree in land surveying is on this list) or complete a combination of education and experience scaled to the level of education attained. At this stage, individuals will be required to complete up to eight years of supervised work in the

field before they can apply to sit for the exam that, if passed, will gain them a surveyor in training (SIT) designation.

After becoming an SIT, candidates will have to have four more years of supervised work experience, and will have to sit for another competency exam, before they can get their license and start practicing their trade independently.

Photogrammetrists who are able to show that they have at least eight years of board approved education and experience, and can provide evidence for other requirements, will be able to gain licensure without a break in their independent work. The other evidence that these photogrammetrists will have to provide includes:

- Certified proof of graduation from high school (with successful completion of courses in algebra, geometry and trigonometry) or certified proof of other, board accepted higher education.
- Evidence of progressively more responsible work experience, including a supervisor's verification of years worked, and clients' verification of the photogrammetrist's personal involvement in at least five projects.
- Three references written by land surveyors attesting to the qualifications and good character of the candidate.

These licensure standards are consistent with the aims of model laws accepted in 2003 by the National Council of Examiners for Engineers and Surveying (NCEES), and the board considers these standards to be appropriate for this proposed licensure program.

The Department of Professional and Occupational Regulation offers the Board of Professional and Occupational Regulation's (BPOR) 2003 report "Study of the Need to Regulate Photogrammetry" as evidence to support the necessity and appropriateness of the proposed regulation. This report concludes that photogrammetrists and users of other remote sensing technologies ought to be regulated because the public expects such regulation.

The report also offers some anecdotal evidence of harm caused that would support licensure. The report relates that, at several public hearings held on this issue:

“...two commenters relayed information regarding a locality that incurred a significant financial loss due to its reliance on faulty work prepared by a photogrammetrist.”

Upon closer study of hearing transcripts, however, at least one of these commenters appears to be making the point that a locality suffered a financial loss because the specifications in their contract with the photogrammetrist did not give them data that was usable for the purposes they intended. This commenter was very careful to point out that the photogrammetrist involved delivered the exact product outlined in his contract. None of the many localities that testified at the four public hearing held reported that they had been harmed by faulty photogrammetric work.

The report discloses another anecdote from a land surveyor who referenced a private developer who may have had to redesign roads and drainage and sewer systems in a development he was building because the original designs were based on faulty photogrammetric work. There was not enough information provided in the hearing notes to allow independent analysis of this private developer's experience. The board feels that licensure would give consumers of photogrammetric services an additional tool to redress harm caused (other than the currently available options of suing for damages and/or threatening the individuals who's work was sub-par with loss of reputation).

Most land surveyors who testified also felt that they did not have the knowledge necessary to certify the work of photogrammetrists with whom they might work. They felt, that being the case, that there was a benefit in licensing photogrammetrists who could then certify their own work.

The proposed licensure requirements will increase the cost to become a photogrammetrist and, so, in the future, there will likely be fewer individuals to offer these services than there would be without the proposed regulation. As a result of this, both land surveyors, and licensed photogrammetrists will likely gain some earning power. Land surveyors will benefit from the shrinking of the pool of possible substitutes for their own licensed profession. Photogrammetrists who stay in, or enter, the field, despite the barriers presented by licensure, will likely experience a bidding-up effect that would result when the pool of consumers of these services compete for the now more limited number of the photogrammetrists.

In contrast to the benefits listed above that might arise from the licensure, current and future photogrammetrists and users of other remote sensing technologies, as well as consumers of their services, will incur numerous costs on account of this proposed regulation.

The costs that the proposed regulants would experience will vary according to whom they are providing work.

Although it is not likely that they would choose to do so, photogrammetrists could choose to provide only exempt services. If photogrammetrists were to provide only exempt work, they would be able to forgo the licensure process but would also incur opportunity costs attached to the work foregone. In order to do non-exempt work for private firms or individuals, photogrammetrists and others would have to have gone through an arduous licensure process as described above. This process will take, at a minimum, eight years and may take more than 12 years. In order to do non-exempt work for state and local governments, photogrammetrists and others will have to go through the licensure process and they will also have to bear additional costs associated with putting together time consuming and minutely detailed proposals for the competitive negotiation process that statute dictates for governmental entities who want to procure the services of certain professionals.

The costs that consumers of photogrammetric services would experience will also vary according to whether these consumers are private or public entities and, for public entities, will vary according to whether the work product will be used for exempt or non-exempt ends.

Private entities that are contracting work will likely not see much differentiation between the cost of work used for exempt ends and work used for non-exempt ends. The market price of licensed photogrammetrists will rise because the pool of candidates will very likely be smaller than it was before licensure. This market price will dictate that non-exempt work would be more costly than it would be absent licensure. As mentioned above, not many photogrammetrists who continue their work in the field would choose to remain unlicensed. In addition, there appears to be no good substitute pool of candidates that can do photogrammetry but are not photogrammetrists. This being said, private consumers of exempt services are likely to see price increases of approximately the same magnitude as those experienced by private consumers of non-exempt services.

The costs that public consumers of these services will bear are greatly complicated by state procurement statutes that require an extremely proscribed method of procurement for the 11 occupations officially identified as “professions” by the Code of Virginia.

State and local public agencies that intend only to use photogrammetric work product for exempt ends will have to pay an increased price because the market price for licensed photogrammetric will be higher. State and local agencies that need photogrammetric work for non-exempt ends will see even larger cost increases.

Historically, localities that needed photogrammetric work done have decided the maximum error tolerances they can accept (as well as other particulars that ought to be in the contract for that work). They have then put out an Invitation for Bids (IFB) in a public forum. After bids were collected, the individual public employee in charge of procuring this work product awarded the contract to the lowest competent bidder who could meet the requirements set out in the contract. Under the proposed regulation, this procurement method may only be used to contract for photogrammetric work product that will be used solely for exempt ends.

An effect of licensing photogrammetrists, and designating that license as a sub-licensure of land surveying, is that state and local public entities will be forced to use the competitive negotiation process to contract for all photogrammetric work products that may or will be used for non-exempt ends. This means that, in addition to bearing the increased cost caused by the increasing market price for photogrammetric services, these public entities will also see increased costs from this procurement process for “professional” services.

Competitive negotiation is a long and arduous process. When state and local public entities need to contract for the services of a “professional”, they will normally form a committee; in any case, this discussion will assume the formation of a committee. This committee would then have to post a notice of Request for Proposals (RFP) in a public forum *and* publish this notice in a newspaper of general circulation. The committee may not, however, ask that the cost for services be listed in proposals.

After two or more proposals have been collected from possible candidates, the committee will talk with each candidate individually (sometimes repeatedly). During these discussions, the committee may encourage candidates to talk about their qualifications and past performance. After that, the committee ranks candidates and begin negotiations with the first ranked candidate.

If the committee and the first ranked candidate can not agree upon a price, the committee would formally release that candidate from negotiations and move on to negotiating with the second ranked candidate. The committee may move down through the ranked candidates but may not return to negotiating with higher ranked candidates.

If no suitable contract is negotiated with any of the candidates, the committee is forced to start the whole process over. This process is very obviously more time consuming and costly than the IFB process. Bill Shinar, who works for the Virginia Information Technologies Agency (VITA) as the coordinator of the Virginia Geographic Information Network (VGIN), commented on this cost differential at the public hearing held in Richmond. He talked about a large project that he worked on (in 2001) and estimated that it would have cost the state at least two million dollars more if he had had to use a competitive negotiation process. Independent analysis indicates that the cost of this project would have been higher using competitive negotiation although the magnitude of the increase could not be verified.

Although the board believes that the statutory definition of land surveying in the Code of Virginia, as amended in 1984, includes the work done by photogrammetrists (and so localities should have been using the competitive negotiation process all along); there is much controversy on this point. The assistant attorney general (AG) assigned to advise DPOR on legal matters concluded, in 2001, that statutory language granting the board power and setting limits on that grant did not allow the board:

‘... requisite authority to sublicense other recognized professions in this area of practice, or to allow various types of licensure for occupations collateral to land surveying.’

In addition to all other costs, the proposed regulation will likely suppress development and use of new remote sensing technologies within the state. Individuals who have new ideas for possibly better technology will likely be disinclined to develop them in this state, since they would have to gain licensure as land surveyor photogrammetrists first. They would be much more likely to develop their ideas in another state that did not have this requirement. In addition, individuals who wanted to use new technologies that had been developed by others would have to gain licensure first.

Businesses and Entities Affected

The proposed regulation will affect all non-exempt individuals who currently practice photogrammetry or LIDAR mapping or who determine topography and contours or depict physical improvements to land using satellite imagery. The proposed regulation will also affect all users of future remote sensing technologies that might come into use. DPOR estimates that 100-200 individuals will apply for licensure once the proposed regulation is promulgated. In addition, consumers of these services will be affected.

Localities Particularly Affected

The proposed regulation will affect all localities in the Commonwealth. The nature and magnitude of any effects will vary according to whether localities employ, or contract with, photogrammetrists. The effects will also vary according to the use photogrammetric work is put to. All effects are discussed in the Estimated Economic Impact above.

Projected Impact on Employment

Individuals who might want to become licensed photogrammetrists or licensed users of other remote sensing technologies in the future will face significant educational costs and significant opportunity costs for time spent under supervision, time spent gaining required experience and time spent preparing for, and taking, competency examinations. They will also incur explicit costs for exam and licensure fees.

Individuals who currently independently use photogrammetric or other remote sensing methods, but do not meet grandfather requirements, will incur some portion of these same costs as well as the opportunity cost that can be assigned for loss of ability to work independently.

Grandfathered individuals will not have to stop working independently until they can become licensed. They will incur various, relatively minor, explicit costs (such as licensure fees, costs to copy documents and postage cost for mailing documentation) as well as considerable implicit costs (for time spent searching out high school and/or college transcripts, time spent gathering proof of employment and of jobs successfully completed and time spent searching out sources for letters of recommendation).

Because licensure will increase the costs associated with entering into, or remaining in, the affected fields, fewer individuals will find it worthwhile to do so. Thus, the proposed

regulation is likely to have a negative impact on total employment for photogrammetrists and users of LIDAR and other remote sensing technologies.

Effects on the Use and Value of Private Property

Licensing will tend to decrease the pool of practicing photogrammetrists and, other things being equal, increase the revenue for the firms employing this smaller pool of now-licensed professionals.

For the non-exempt work that these firms do for other private firms or individuals, if this increase in revenue is greater than the extra costs incurred (in the licensing process and for higher salaries for licensed photogrammetrists), these photogrammetric or other remote sensing firms will likely earn a greater profit. If, on the other hand, costs associated with licensure exceed any increase in revenue, firms will likely earn less profit.

For the non-exempt work these firms do for localities or the state, if this increase in revenue is greater than the extra costs incurred (in the licensing process, for higher salaries for licensed photogrammetrists and as a result of the method by which state and local agencies must procure their services), these photogrammetric or other remote sensing firms will likely earn a greater profit. If, on the other hand, costs associated with licensure exceed any increase in revenue, firms will likely earn less profit.

Firms will likely have a greater chance of increased profits when working in the private sector than when working for public entities.

Small Businesses: Costs and Other Effects

Most, if not all, 100-200 individuals DPOR estimates will be immediately affected likely currently work for small businesses. DPOR estimates that there are 10-20 such businesses in the Commonwealth. Costs and other effects are listed in the section above.

Small Businesses: Alternative Methods that Minimizes Adverse Impact

Since legislation allows, but does not require, the board to license photogrammetrists and users of other remote sensing technologies; the board has the option of eliminating adverse impacts entirely by not requiring these individuals to be licensed. Barring that, and because there is little clear evidence to support a need for the level of the education/experience requirements in the proposed regulation, the board could choose to require less education/experience for these

individuals. This would minimize the adverse impact of costs associated with becoming licensed but would not affect the costs associated with being labeled “professionals” for the public procurement purposes.

Legal Mandate

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 2.2-4007.H of the Administrative Process Act and Executive Order Number 21 (02). Section 2.2-4007.H requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. Further, if the proposed regulation has adverse effect on small businesses, Section 2.2-4007.H requires that such economic impact analyses include (i) an identification and estimate of the number of small businesses subject to the regulation; (ii) the projected reporting, recordkeeping, and other administrative costs required for small businesses to comply with the regulation, including the type of professional skills necessary for preparing required reports and other documents; (iii) a statement of the probable effect of the regulation on affected small businesses; and (iv) a description of any less intrusive or less costly alternative methods of achieving the purpose of the regulation. The analysis presented above represents DPB’s best estimate of these economic impacts.